W1TKZ

The Spark Gap

May 1987

Book XII Vol V

Official Journal of the Wellesley Amateur Radio Society

President's Message

by Tom Kinahan, N1CPE

We have a full slate of things to do as a club in the coming months including some of our biggest and best operating events, the **June VHF Contest** and **Field Day**. Let me know of your interest in the VHF Contest, as room reservations must be made early, and get all your rigs ready for Field Day. Why don't we try something silly this FD and operate 15A (15 simultaneous transmitters and emergency power) ? That'll require 15 simultaneous operators, 15 simultaneous radios, and 15 simultaneous antennas. We'll need a BIG turnout and everyone must bring a complete station.... Are we up to it?

Speaker

Jim Morris, K1UGM from Wakefield, will be our speaker on May 21st. Jim will discuss Radio Direction Finding. Jim is active in many modes on amateur radio, including operating a packet bulletin board system. Please join us on May 21st to welcome Jim to W.A.R.S. and listen to this interesting talk.

Special Events Station

I would like to propose an operating event for this Autumn that would involve all members (even those who dislike contesting), obtain publicity for WARS, and net us some new members. A special events station provides an ideal opportunity.

A special events station operates on one or more frequencies and has brief QSO's with as many stations as possible. It issues special QSL cards or certificates to commemorate a special event. I propose that we operate W1TKZ as a special events station in the novice SSB portion of 10 meters to celebrate the new novice privileges.

Operating a special events station is more relaxed than contest operations. There is no pressure to make the numbers, so there is time for a small chat. This should appeal to many folks.

Special event stations are publicized one or two months in advance in the major ham radio magazines. Since many of the QSO's would be groundwave, mention would also be made on 2 meter repeaters. We can also submit articles to the local newspapers explaining our operation and inviting the public to come over to the Red Cross building and watch. This is good publicity for the club. (continued, Pg 2)

MEETINGS THIS MONTH:

May 7, 1987 at 7:30 P.M.
May 21, 1987 at 7:30 P.M.
211 Washington St., Wellesley

We can issue special QSL cards commemorating new novice privileges that are similar to the special cards that we issue for the Mt. Equinox expeditions. The cost for 500 cards is approximately $ 60. Each station that sends us a QSL card and a self-addressed, stamped envelope can receive one of the special cards as well as an information sheet that explains all about Wellesley ARS activities and invites the ham to come to one of our meetings.

The ideal date for the special event is on Saturday, September 19. We already have the run of the Red Cross as an FCC exam is scheduled for that date. We should also be able to convince some of the newly upgraded to pitch-in and operate for a while.

Below is a project plan that I propose the membership consider:

- **Special Events Station** : To celebrate 10 meter novice SSB privileges September 19 from 9 AM to 9 PM.
- **March** : Permission obtained for Red Cross building.
- **May** : Announce in Spark Gap, ask for membership approval.
- **June** : Send announcements to QST, 73, CQ, WorldRadio for publication in September issues. Also send announcement to ARRL section manager and some of the local clubs for publication in their newsletters.
- **July** : Design QSL card and have 500 printed. Design the WARS publicity sheet that accompanies each card.
- **August** : Ensure that the linear amp is working. Telephone members to get manpower for operating the station. Submit articles to Wellesley Townsman and Middlesex News.
- **September** : Announce on the repeaters. Operate the station on 9/19. As QSL's are received, respond.
- **October** : As QSL's are received, respond. (continued, Pg 3)

Calendar !

- *May 2* : FCC exam .. All Classes .. Wellesley Red Cross
- *May 7* : W.A.R.S. Business Meeting
- *May 8* : 902 MHz Sprint
- *May 14* : 1296 MHz Sprint
- *May 21* : W.A.R.S. Meeting .. Wellesley Red Cross .. Radio Direction Finding .. Jim Morris, K1UGM
- *May 23-24* : 50 MHz Sprint
- *June 13-15* : June VHF Contest .. Mt. Equinox, Vt. .. FN33
- *June 18* : W.A.R.S. Meeting .. Elections .. Organizing for Field Day
- *June 26-27* : Field Day .. W1TKZ
- *July 24-26* : Heavy Hitters Hamfest Topsfield, Ma.
- *August 1-2* : UHF contest
- *September 12-14* : September VHF Contest .. Mt. Equinox, Vt .. FN33
- *September 19* FCC Exam .. All Classes .. Wellesley Red Cross .. Special Events Station W1TKZ .. Our own version of Novice Enhancement Weekend !
- *September 26-27* : Amateur Radio at the Science Museum, Boston, Ma.

This project can have many benefits for the club. Members can become involved in a low-pressure operating event either by operating, or helping with the QSL effort. WARS can obtain publicity and new members. I believe that the special events station has the potential to be a fun and rewarding experience. Please consider giving it your support.

Vern, ND1Z

Elections

Elections for next year's club officers will be held at the June 18th club meeting. The following is the slate of nominations:

- **President** - Tom Kinahan, N1CPE
- **Vice President** - Rita Baker, N1DDI; Mort Cohan, KA1IU
- **Corresponding Secretary** - Kathy Pate, KA1IYR
- **Recording Secretary** - Roger Smith, W1EOA
- **Treasurer** - C.J. McDonald, WB1BUM
- **Fund Raising Chairman** - Dave Kent, N2AWG; Thomas Burton, KX1H
- **Operations Chairman** - Vern Valero, ND1Z

If you can't make the election meeting in June, be sure to send us the enclosed form with your choices for these offices such that it arrives on or before June 18th in order to be counted. Note that write-in candidates will be accepted, but that the write-in candidate has the option of not accepting the office, in which case we will conduct an additional election at the earliest convenience to fill the vacant seat.

Public Service

We've been asked to help with medical communications for a Biathlon (running and biking) on Sunday May 31st. It involves simply looking out for participants that may have been injured and calling net control to get medical help. The bike portion of the race needs communications most, and it winds through the towns of Wellesley, Wayland, Weston, and a small section of Newton. Contact Tom Kinahan, N1CPE at 898-2749 or on the air if you can help.

Field Day Barbecue

It is time to start thinking about the premier Wellesley ARS social event of the year, the Field Day Barbecue ! This is a great time to get outdoors and party with all our friends.

Please consider participating in this fun event. Besides spreading the word, try to think of ways to make this year's (continued Pg 4)

OFFICERS

President
Tom Kinahan, N1CPE, 898-2749
Vice President
Rita Baker, N1DDI, 481-0863
Recording Secretary
Roger Smith, W1EOA, 235-6239
Corresponding Secretary
Arthur Thompson, KA1ENP, 235-5509
Treasurer
C.J. McDonald, WB1BUM, 332-6091
Fund Raising
David Kent, N2AWG, 875-2126
Operating Activities Chairman
Bob Drapeau, KT1K, 883-1132
Education Chairman

Repeater Committee Chairman
Paul Davis, N1EGC, 646-3599

The Spark Gap

Official Journal of the Wellesley Amateur Radio Society

Editor:

Jon Freeman

17 East Meadow Road

Lowell, Ma. 01854

The Spark Gap is a monthly publication of the Wellesley Amateur Radio Society, its sole purpose is to keep its members abreast of current happenings, FCC rule & regulation changes and to list equipment offered for sale or trade by members. Members are encouraged to contribute to the Spark Gap and may send their articles to the editor's address or to the club address. Items printed in the Spark Gap may be reprinted by other Amateur Radio publications provided the author and the Spark Gap are given credit.

The Wellesley Amateur Radio Society is a non-profit organization dedicated to the promotion of Amateur Radio through instruction, fellowship, demonstration and participation. Annual membership in the society is $10 and the club year runs from September 1 through August 31. Amateur Novice through Advanced classes are conducted regularly at no cost. To enroll in a class or gain information about the Society in general, write :

The Wellesley Amateur Radio Society

211 Washington Street

Wellesley Hills, Ma. 02181

barbecue better than ever. Bring friends and family, especially folks who might be getting interested in amateur radio or our club.

Contact Liz, KA1PNA (533-6822) if you would like to help or have some special ideas about this party.

220 MHz Comments

As voted at the April 16th meeting, the Wellesley Amateur Radio Society is submitting comments on the reallocation on the 220-222 MHz amateur band. If you would like a copy of the W.A.R.S. comments, send us an SASE at the club address, and we'll send a copy right back to you.

Net !

Don't forget the WARS net on the 147.63/03 repeater at 8:00 P.M. EDT on Wednesday nights.

Are We Legal ?

submitted by **Bill N1ADY**

extracted from :

- Packet BBS, K1BOG, Attleboro 147.090
- also, N1DKF, Cranston 147.070

The following item recently appeared on several local Packet Bulletin Boards. It is reprinted here for the benefit of those who do not have ready access to Packet.

Spring has sprung and the road race, triathlon, canoe race and marathon running season is upon us. And, as in years past, radio amateurs are being asked to help out with communications.

However, in our enthusiasm to provide service to the public we must be careful not to be drawn into activities which will put our licenses in jeopardy.

Specifically, we should remember that almost all events are commercially sponsored and are being run by professional race organizers. Further, many events are advocating a cause. The worthiness of the cause is not at issue here. What is important is the question "are radio amateurs being used to further the regular business activities of the race operators ?"

To assist with lost child searches, to call for medical assistance for both spectators and event participants, and to perform other **EMERGENCY** operations are quite probably perfectly legal functions for amateurs. On the other hand, to provide race timing, positions of runners past

checkpoints, bus dispatching and press feeds sounds dangerously like participating in the regular business of the event operator.

There are some who believe all of the above activities are appropriate for radio amateurs. But in this era where our frequencies are being sought by other services we should proceed cautiously. If commercial activities are taking place on the amateur bands it only strengthens the positions of those other services who want to take over our bands.

Thoughtful amateurs as well as ARRL Section Official Observers can help here by watching these activities and by providing guidance to help keep us legal. In the long run we will be protecting both our licenses and our frequencies.

73, Bill N1ADY 19 Apr 87

Renewing Your ARRL Membership

If you're renewing your ARRL membership, please send your completed membership form and your check, made out to "Wellesley A.R.S." to the club at 211 Washington St. Wellesley, Ma. 02181. We will then forward this to the ARRL on your behalf. This way, we are able to make $2.00 from each renewal.

Part IV : Computer Communications

By Vern, ND1Z

Imagine what Amateur Radio would be like if everyone invented their own operation techniques ? Perhaps one operator would call CQ and another would yell AMHERE. Maybe hams in Region 1 would use QTH, but those in Region 2 would use QTL for location. Or even worse, maybe stations on 2 meter repeaters would constantly double, triple, and quadruple. Clearly, some rules and conventions are necessary.

Somehow, over the years sets of rules have evolved to make Amateur Radio a more or less smooth operation. Many of the CW procedures and abbreviations were taken from the landline telegraphers. Some of the voice procedures were taken from the military. Some procedures were invented for and by, amateurs. With the exception of the pile-up (an obvious ham tradition) the system works well.

A protocol is a set of rules established to effect efficient communications. Computers need such rules to communicate with I/O devices, operators at terminals, and other computers. Computers are very fussy and can not interpolate what the person or computer at the other side really meant.

Engineers and scientists like to view natural phenomena in terms of models. Ohm's law is a model for predicting currents and voltages in a circuit. Complex impedance and phase is a model for describing current and voltage inconsistencies in circuits with capacitance and inductance. Likewise, a model has been developed to deal with computer communications.

The Open Systems Interconnect (OSI) model proposes a hierarchical structure with seven layers. Layer 1 is the Physical Layer, which describes the electrical signals present on the cables. The Link Layer (2) ensures that raw data can be transmitted from point-to-point error free. If an error is detected in a block of data, it is resent. The Network Layer (3) imposes a unique address (a number) to every station of interest and routes data from a source station to a destination station. The Transport Layer (4) ensures that blocks of

data get delivered in the proper order and assigns some logical socket number to the raw network addresses. The Session Layer (5) negotiates connections to a specific service on the target computer. (such as a bulletin board system). The Presentation Layer (6) performs special processing on the data, such as translating data from Baudot code to ASCII code. Finally, the Application Layer (7) is totally defined by the user to accomplish his or her specific purposes.

In each case, a higher level calls a lower level. For example, the Transport Layer subroutines would call subroutines of the Network Layer. This is known as an interface. A specific layer sends coordination messages to its similar layer on the other system. (known as a peer layer). For example, the Network Layer on computer A would send a 'Connect Request' to the Network Layer on computer B. The Network Layer on computer B would then send a 'Connect Accepted' message back to the Network Layer on computer A. This is known as a protocol.

Computer communications development has had close ties with the telephone network. Government regulation and economics dictated that the common carriers would be used for data transmission. The telephone system is an analog network and computers send digital data. Devices known as MODEMs (MOdulator-DEModulator) were used to translate digital data to analog data to transmit over the telephone and then from analog to digital at the other side.

The early computer protocols followed the telephone system methods. In circuit switching, a computer (or I/O device) would either have a dedicated telephone line (one that never hangs-up) or dial-up to establish physical connection. There were great problems with using telephone lines for data transmission. Normal voice grade lines, although reliable for voice, were very noisy over long distances to the extent that data was corrupted in transmission. Further, the speed at which data could be transmitted was limited. Large companies were able to lease high-speed and conditioned (less noisy) lines from the telephone company. But leased lines were very, very expensive and less reliable than desired. Further, the leased line might not be used for long periods of time. That represents wasted money. Wouldn't it be great if a user was charged for the amount of data sent, rather than the time connected?

Computer communications naturally tends to be in the form of bursts. A file is sent from one computer to another in a short time and then there is a long period of silence. Terminal users request a screen of data and then sit for several minutes reading the results.

The long term solution evolved from a series of research efforts in the 1960's that evolved into the Advanced Research Projects Administration NETwork. (ARPANET) ARPANET sent (and still sends) data in bite-sized chunks known as packets. Data is sent within the network digitally wherever possible (such as with satellite links). Data transmission speeds within the network are very fast, and users are charged for the actual usage of the network, by the packet.

A packet is a fixed-size chunk, or block, of data to be sent out on a network. A packet contains header information, user data, and trailing information. All the information of where the packet came from and where it is supposed to go is in the header area. All error checking information is in the trailer portion. Large blocks of data are broken up into several packet transmissions. A serial number in the packet

header helps keep the packets from getting out of order.

There are two main advantages to packet switching. First, the user of the channel can be charged by actual data usage and not connect time. The second is that many users can use the same channel. Different programs (or terminals) can share the channel because each packet has a source and destination address in it. This concept is known as multiplexing and it is a way to save money. Note how advantageous channel sharing is in amateur radio.

By the early 1970's packet communications began to catch on. Representatives from the industrialized world met to map out a strategy to build an international digital network. The result was a standard that included a physical layer, a link layer, and a network layer. This standard is known as X.25.

The X.25 philosophy involves a huge international network with each station having its own unique network address. The source is a 'cloud' with the destination at the other end. The source does not need to know what links are necessary to get to the destination, only the destination's address. Further, the network is internally capable of moving packets at great speed because of the use of high speed links such as satellites and optical fibers.

Today many nations have one or more data networks that all tie together internationally. The United States has Telenet and Tymnet, although Telenet is more widely used. It is now possible to log-in to remote systems or send data without long dial-ups or costly dedicated lines. Packet communications makes it all possible.

The X.25 protocol specifies a link layer, for the time being, of RS-232. Those with home computers might notice the RS-232 plug at the back of the unit. In the future RS-232 will be replaced with a more flexible protocol.

The X.25 link layer is known as High-level Data Link Control (HDLC). Each chunk of data that HDLC works on is called a frame. The frame contains a start-and-stop pattern called the flag. It also contains source and destination addresses, control information, and of course, user data. One station sends a 'connect' packet to another station. The other station accepts the connection, and then data packets are exchanged. Eventually, the two stations disconnect and the action is over.

Amateur radio X.25 (AX.25) deviates slightly from the standard. One major difference is that in the link layer frame, 'To' and 'From' addresses contain call signs. (Anybody surprised ?) Further, to support multiple connections, a special number is appended to the callsign. So the connection ND1Z-0 might be sending a file to NF1Z-1 , while ND1Z-1 might be rag chewing with N1CPE-0.

The X.25 network layer specifies procedures for cleanly keeping track of connections and data reliability. The Radio Amateur AX.25 looks a bit different from the standard X.25 network layer, so we will not discuss it further.

Amateur packet radio does not fit cleanly within the OSI model, or even within X.25. It is still evolving, and perhaps some of us will become involved in its development. In any event, the potential exists to develop a world-wide network of stations that will enable us to serve the public as never before.

The next article of the series will investigate the nuts and bolts of becoming involved with Packet Radio. (contin. P 9)

Wellesley Amateur Radio Society
Absentee Ballot, 1987

President

Tom Kinahan, N1CPE _____ Other _____

Vice President

Rita Baker, N1DDI _____ Mort Cohan, KA1IU _____

Other _____

Corresponding Secretary

Kathy Pate, KA1IYR _____ Other _____

Recording Secretary

Roger Smith, W1EOA _____ Other _____

Treasurer

C.J. McDonald, WB1BUM _____ Other _____

Fund Raising Chairman

Dave Kent, N2AWG _____ Thomas Burton, KX1H _____

Other _____

Operations Chairman

Vern Valero, ND1Z _____ Other _____

If you can't make the June 18th Meeting when elections will be held, please send this blank to the club address so that it arrives on or before June 18th to get your vote counted. One vote per member.

Wellesley Amateur Radio Society
Election Committee
211 Washington St.
Wellesley, Ma. 02181